PATENT SPECIFICATION

614,641

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COMPLETE SPECIFICATION

Improvements in Track Brakes

I, PETER MADSEN, of 24, Magnoliavej, Copenhagen-Valby, Denmark, a Danish Subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to electro-magnetic track brakes for rail vehicles, such as tramcars or railway trains, of the kind in which the brake shoes are formed by the pole pieces of the magnet and directly engage the vehicle rail by electro-magnetic attraction.

Brakes of the foregoing kind suffer from the disadvantage that their effectiveness varies to a great extent on the wear of the rails. This is mainly due to the fact that the running surface of the rail, which in new rails is substantially horizontal, is worn down in use which may result in the rail surface having a transverse inclination of up to about 8 deg. Since the brake shoes are normally mounted for vertical actuation only a small portion of the shoe bearing surface contacts the rail thus considerably reducing the braking effect.

Various proposals have been made to remedy this drawback. Thus for instance it has been proposed to provide the bearing surface of the brake shoe with a transverse incline or chamfer of about 3 deg. to offset the effect of worn rails. By this means the greatest angle between the rail surface of worn rails and the brake shoe surface does not exceed more than 4 to 5 deg. although this arrangement to some extent remedies matters with worn rails, the braking effect on new rails with a substantially horizontal surface is on the other hand reduced.

Furthermore, it has been proposed to provide the brake shoe with a yieldable bearing surface by providing such surface with transverse incisions or discontinuities. This however results in considerably weakening the brake shoe and to some extent reducing the braking action.

[Price 2/-]

It has also been proposed to make electro-magnetic track brakes self-adjustable but such constructions suffer from the drawback that when the brakes are applied on a worn rail surface the brake shoes only fully contact the rail surface after they have been applied for some time and then only with difficulty. Since at the commencement of the braking operation the shoe is only in point contact with the uppermost oblique edge of the rail, a relatively small braking effect is produced since a relatively small portion of the lines of magnetic flux pass direct from the brake shoe to the rail whereas the majority pass through an air space. Inasmuch as the magnetic resistance of air is between two thousand and a thousand times greater than that of iron, even only a small space between the rail and the brake shoe considerably decreases the braking force.

In spite of the brake shoes being self-adjustably mounted complete contact between the shoe and the rail does not occur at once because the magnetic force is transferred in part to the members fastening the brake shoe to the vehicle and since these members have hitherto been constructed in such a manner that the magnetic influence created considerable friction among the moving parts, movement of the shoe cannot easily take place because the force required to overcome the aforesaid friction is greater than the force available to move the brake shoe for complete face-to-face contact with the rail.

The present invention aims at obviating the foregoing drawbacks in a simple and economical manner by a construction in which the connection between the brake shoe and the vehicle by which the braking effort is transmitted to the vehicle, is such that the connection is not unduly affected by magnetic influences and that a minimum amount of power is needed to rock or turn the shoe about its longitudinal axis, after first or point con-

tact is made between the brake shoe and the rail, to ensure substantially complete face-to-face contact therebetween.

To this end the present invention provides an electro-magnetic track brake for rail vehicles of the kind having a brake shoe formed by the pole pieces of the magnet, the shoe being resiliently mounted for vertical movement over the vehicle rail, in which the braking effort is transmitted to the vehicle through a member extending substantially longitudinally at each end of the brake shoe near the plane of contact with the vehicle rail, said member being rockably connected to a vertically arranged thrust rod, rigidly secured to the vehicle, in such manner that the shoe has a limited turning or swinging movement about the longitudinal axis of the shoe, whereby to compensate for any lack of parallelity between the contacting surfaces of the brake shoe and vehicle rail due to wear of said rail. By ensuring that the connection between the brake shoe and the vehicle is near the plane of contact of the vehicle rail only a very small force is required to move the brake shoe.

According to a further feature of the invention the rockable connection between the brake shoe and the vehicle comprises a lug or arm on the end of the shoe slotted horizontally to form two ears for the reception of one end of a closed link or eye, the other end of which embraces the thrust rod, and a stud or pin extending through said ears and link to retain the link in the slot. Preferably the link or eye is so shaped or constructed as to allow relative movement between the link, the thrust rod and/or the stud.

In order that the invention may be more readily understood reference is made to the accompanying drawings which illustrate diagrammatically and by way of example one embodiment thereof and in which:—

Fig. 1 is a cross-section of a new rail and a brake shoe;

Fig. 2 is a similar view showing a worn rail;

Fig. 3 is an end view in cross-section of an electro-magnetic track brake;

Figs. 4 and 5 are a side elevation and top plan, respectively of the brake of Fig. 3; and

Fig. 6 shows the track brake of the invention mounted on a rail vehicle.

Referring to Fig. 1, a new rail with horizontal bearing surface is indicated by 1 and a brake shoe by 2. In Fig. 2, the shoe is indicated by 3 and the worn rail by 4, the surface 5 of which is inclined slightly. It will thus be seen that only a small part of the area of the brake shoe contacts the rail during braking.

Referring to the embodiment of Figs. 3 to 5, 6 and 7 denote pole pieces, the lower edges 8 and 9 of which form brake shoes for engagement with a rail or track 13. 10 is an electro-magnet coil and 11 the core which are secured between the pole pieces. Two lugs 12 are secured to the upper edge of one of the pole pieces, by means of which the brake shoe is suspended from the vehicle, a stud and spring (not shown) being usually provided for this purpose.

The braking effort is transmitted to the vehicle by a rockable connection indicated generally by the reference numeral 13. This connection consists of a longitudinally extending lug or arm 14 secured at the end of one of the pole pieces near the plane of contact with the rail. Arm 14 has a transverse slot 15 which forms two ears 16 and 17 between which one end of a link or eye 19 is received. Link 19 is pivotally held between the ears 16 and 17 by a stud or pin 18 passing through holes in the ears and the link. The other end of the link 19 embraces a vertically arranged thrust rod 20 secured to a suitable point on the vehicle.

Fig. 6 shows the brakes mounted on the chassis 30 of a rail vehicle having wheels 31 mounted on axles 32. 33 indicates generally the electro-magnetic brake shoes suspended by springs 34, the upper ends of which are attached to lugs 35 rigidly attached to the side members of the chassis which rest over the wheel bearings. 36 and 37 indicate arms, similar to the arm 14 of Fig. 4, which are rockably connected to the thrust rods 40 and 41 by links 38 and 39, respectively. 42 and 43 are lugs attached to the chassis of the vehicle to which the thrust rods 40 and 41 are respectively attached. 44, 45 and 46 are cross bars of the chassis frame, and 47 and 48 are the rails.

It will be seen that with the construction according to the invention the brake shoe is able to move with only very slight friction about the thrust rod since movement takes place substantially about only a single point on the rod. This coupled with the fact that connection is made near the rail surface permits the brake shoe to adjust itself to any condition of wear of the rail with a minimum of effort.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. An electro-magnetic track blade for rail vehicles of the kind having a brake shoe formed by the pole pieces of the magnet, the shoe being resiliently

mounted for vertical movement over the vehicle rail, in which the braking effort is transmitted to the vehicle through a member extending substantially longitudinally at each end of the brake shoe near the plane of contact with the vehicle rail, said member being rockably connected to a vertically arranged thrust rod, rigidly secured to the vehicle, in such manner that the shoe has a limited turning or swinging movement about the longitudinal axis of the shoe, whereby to compensate for any lack of parallelity between the contacting surfaces of the brake shoe and vehicle rail due to wear of said rail.

2. Track brake as claimed in claim 1, in which the rockable connection comprises a lug or arm on the end of the shoe slotted horizontally to form two ears for the reception of one end of a closed link or eye, the other end of which embraces the thrust rod, and a stud or pin extending through said ears and link to retain the link in the slot.

3. Track brake as claimed in claim 2, in which the link or eye where it embraces the thrust rod or stud, or both, is wider than the width of those parts to allow relative movement therebetween.

4. Track brake as claimed in claim 2 or 3, in which the thrust rod and stud are circular in cross-section.

5. Track brake as claimed in any of claims 2 to 4, in which the link or eye is curved at the points of contact respectively with the thrust rod and stud.

6. The electro-magnetic track brakes, constructed, arranged and adapted to operate, substantially as hereindescribed with reference to the accompanying drawings.

Dated this 15th day of July, 1946.

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[This Drawing is a reproduction of the Original on a reduced scale.]

Fig.1.

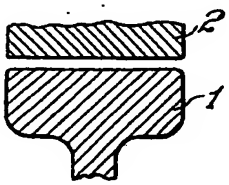


Fig.2.

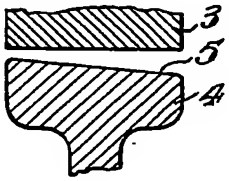
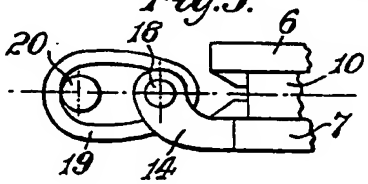


Fig.5.



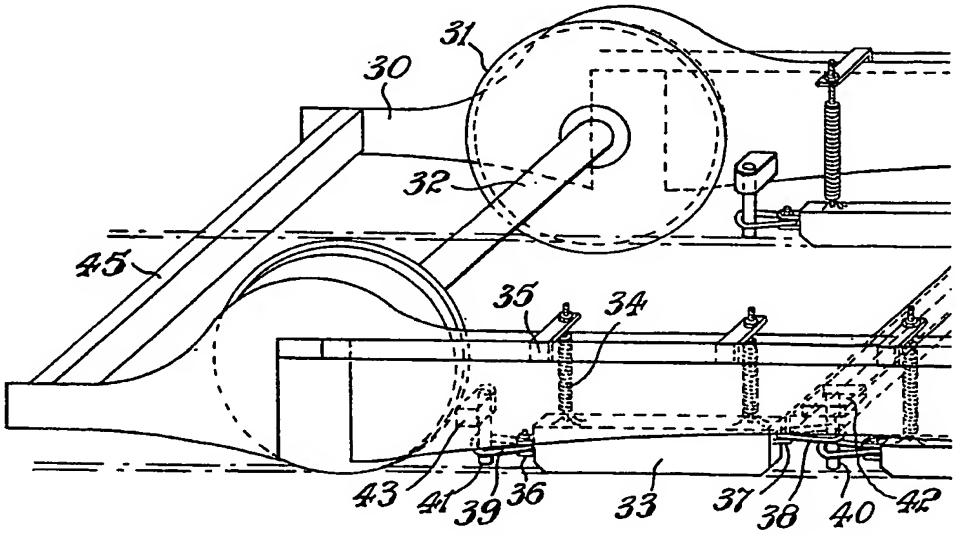


Fig.3.

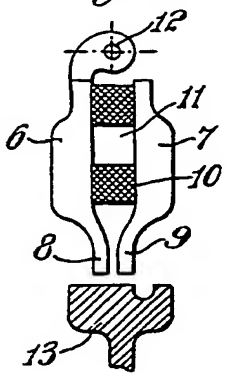


Fig.4.

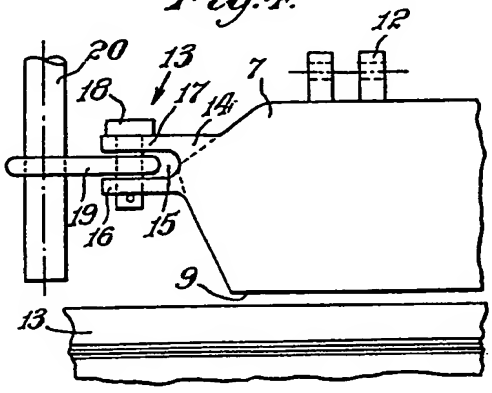
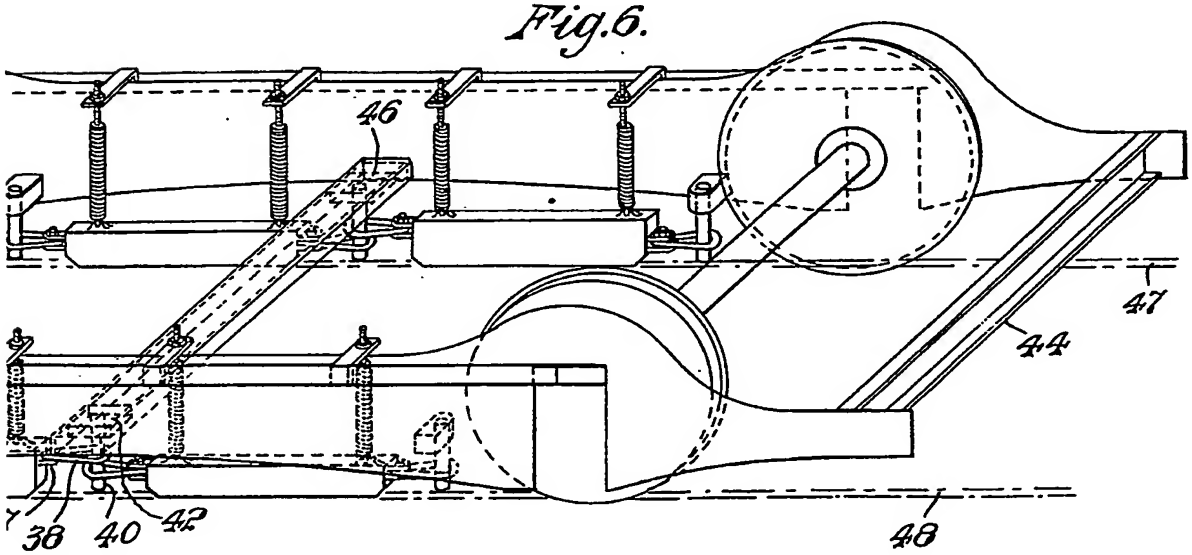


Fig.6.



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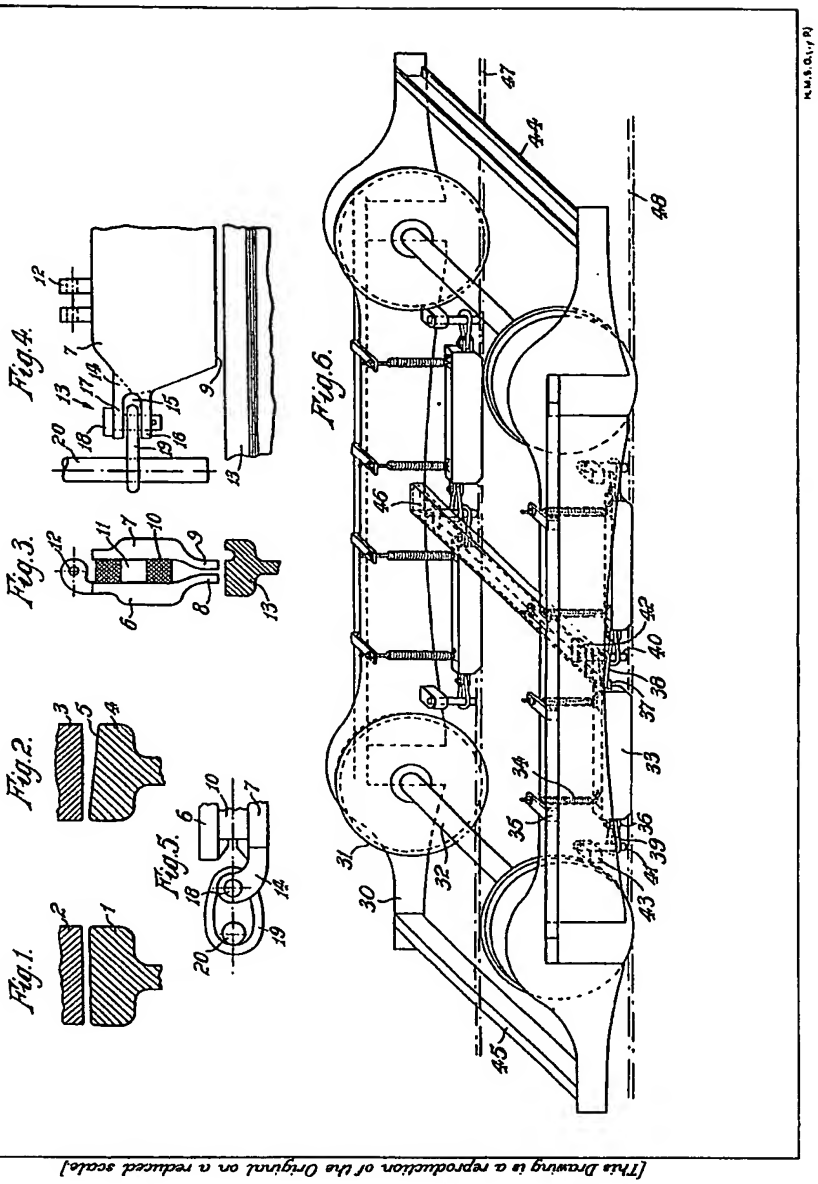
614,641 COMPLETE SPECIFICATION



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